Asia Pacific Education Review
2004, Vol. 5, No. 2, 207-214.

IT Entry Knowledge and Skills of University Teachers vis-à-vis their Interest Levels: The Case of the Oldest University in Asia

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Technology, considered as the new language of teaching and learning, is an irrevocable reality. Any institution of higher learning is expected to look into the future without losing sight of its core capabilities-the malleability of its faculty members. Today, more than ever, teachers are expected to operate in an environment where "hi-teach", "hi-touch" and "hi-tech" govern their instructional behaviors. It is in this light that this study was conducted to situate teachers coming from a time-tested institution, such as the University of Santo Tomas, the oldest university in Asia, in terms of their IT knowledge, skills, and interests with a view to identifying implications on how faculty development programs may be made more responsive to the present-day educational structure.

Key Words: interest levels, IT knowledge and skills, professional development

The new source of power is not money in the hands of the few but information in the hands of the many.
John Naisbitt

One of the critical issues that the schools of today are expected to resolve is how their educational efforts and concerns can achieve significant growth in technology and responsive advancement in pedagogy. Schools representing various levels of education always find strength and direction from the perspectives of various fields of human endeavor. Psychology, sociology, anthropology, philosophy and history, among others, have given education significant tools in actualizing its end-goal of reforming social structures through the quality of their graduates. The dynamic partnership between pedagogy and technology has posed problems, issues and concerns on the very role of the latter in relation to the former (Whitaker & Coste, 2002). To date, while many fields have realized the potential use and application of technology to facilitate business and scientific operations, educational technology, for its part, has had only an insignificant impact as far as education and training are concerned (Mann, 2002; Vitolo & Coulston, 2002).

Systemic change or a paradigm shift will have to occur in the school setting. All academic institutions, in their desire to deliver the best kind of education with maximum efficiency and marked productivity have made technology integration as one of their topmost priorities in structuring the school's academic centerpiece. Dede (1997), in his article, On Technology Schools, posits that new technologies can help transform schools if they are used for adopting new models of teaching and learning. These models of teaching and learning, according to Dede, may be critically examined if schools can clearly and solidly distinguish between "inert" and

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"generative" knowledge. The former refers to what one already knows; the latter is what brings about changes in one's mental mode. If students are the end-users of all educational effort (Newhouse, 2001), teachers who are always at the forefront of the education process are expected to enjoy continuous, sustained development of knowledge and skills development through seminars, lectures and other teacher-related programs intended to hone their conceptual, technical and human relations skills (Godfrey, 2001a).

Technology, just like change, is contagious and inevitable (Yuen, 2003). No dynamic organization, including educational institutions can evade the impact and power of technological change (Godfrey, 2001b; Williams, 2002). It is, however, quite alarming to note that the exposure of students to technological processes in their environment is incomparable to the limited and feared exposure of most teachers to technologically-dominated learning environments. What a great disservice to technologically-literate students, today, if teachers fail to match their teaching styles with the student's preferred learning modality which uses technological devices for greater access and equity. And, what a waste it is on the part of the school to invest much of its resources in state-of-the-art equipment, if teachers prefer the traditional simple lecture and students rely on passive listening as a means to achieve "authentic learning".

Making teachers comfortable with the use of technology entails a significant improvement in both the structural and conceptual models of their development. Teacher development is rooted in the school's commitment to improvement, which in the jargon of the Japanese is termed as "*kaizen*"—a philosophy which posits a never-ending journey of improvement for oneself, family and friends and workmates, community, and ultimately, the world. Applied to total quality organizations, such as educational institutions, there is a need to view learning not merely as a collection of linear, consecutive segments of one-way communication, but rather, a development process, spiral in nature and with students and teachers' energies focused on unlimited continuous improvement (Bostingl, 1996). In a school environment that is continually challenged by technological change and challenges, preference for this status quo would lead to educational obsolescence and school atrophy. For a school to be a truly authentic learning community, the administrators, teachers, students, and non-academic personnel must consider the learning process as a journey, not a series of destinations as they learn various coping mechanisms and other survival skills. It is only in this perspective through which the school can transcend itself from its present status. Any attempt to experience technological transcendence is attitudinal and institutional. No matter how excellent these strategic and tactical planning systems are, no significant advancements can be made without strong commitment from the rank and file. The success of "innovation diffusion", as defined by Everett Rogers (Frenzel, 1996), depends on the end-users' propensity to accept new ideas or innovations. Very few individuals who are eager to accept new ideas become champions of innovation. They are called *pioneers*. A somewhat larger group who accepts innovation readily are *early adopters*. The process continues until the innovation is accepted by the majority. The last individual to adopt, the most resistant to the new idea, are the laggards.

The extent to which innovation and diffusion take place in the school environment is conditioned by the quality of innovation. Dr. W. Edwards Deming, an internationally renowned authority in the field of statistical quality control, propounded the idea of Total Quality Management in his Fourteen Points of Quality (Bostingl, 1996). Among these constructs, three points best justify the rationale of this investigation. First, Point 3, "Institute programs of training". This dictum, once contextualized in the school, means that school leaders must provide training programs for all teachers particularly those who are unfamiliar with emerging trends and practices in the field. In this age of information technology, the old dictum, "once trained, always-trained experts," is passé. Continuous improvement of teachers is always linked to continuous learning. Technology and its effective application are closely linked to continuous improvement inherent in the quality education philosophy (Hertzke & Olson, 1994).

Second, Point 13, "Institute a vigorous program of education and retraining". All sectors of the institution benefit from encouragement to enrich their pre-service education ideas and interests beyond the confines of their professional and personal worlds. If the school is to be at the leading edge and if it aspires to maximize customer satisfaction, continuous and sustained faculty development programs are deemed necessary.

Point 14, "Take action to accomplish the transformation" requires a well-orchestrated effort and dedication on the part of top-level management and the rank and file. Action programs may take the form of various eclectic continuing programs of education consistent with the felt needs, problems and interests of the end-users vis-à-vis the capability of the school and the awareness of prevailing situations in the community.

The 21st century university, being made up of social, cultural and economic environments, has five (5) distinct technologies to manage. These technologies are not a mere collection of ideas and techniques but a powerful ensemble of processes, procedures, and tools that must be used altogether to create new and effective learning and teaching systems (Salisbury, 1996). The technologies are briefly described as follows:

- *Systems thinking* is the technology for seeing the entire system and considering all of the factors that interact and bring about results;
- *Systems design* is a set of methods and specific activities for creating new solutions to serious problems;
- *Auality science* is the technology for monitoring the processes within a system to ensure that those processes produce the intended result.
- *Change management* is the technology that leaders must use to guide their organizations into intended realms. It helps the leader succeed in sponsoring, initiating and implementing change within an organization; and
- *Instructional technology* is part of the information and communications revolution that is driving change in almost every sector of society today.

To experience the price of technology investment learning institutions and organizations must develop an attitudinal disposition for adopting that technology in its context as a "means", not an end. Otherwise, educational and technological wastage, as evidenced in the so-called single-loop learning, is most likely to occur. The search for quality teaching, just like "kaizen", is a never-ending process. This outlook, along with the risk-taking behavior of the school and its components undoubtedly constitute a benchmarking strategy on the part of fast learning organizations such as schools, colleges, and universities.

No dynamic organizations today can overlook the advantage of benchmarking with technology and through technology. The experiences of business and scientific organizations have proven how benchmarking (or the processes of monitoring successful experiments from all around the world as possible models from which to learn and adopt new ideas from local environments) reforms and transforms the efforts of schools in terms of quality delivery of educational services.

The University of Santo Tomas, the locus of this study, has been a living witness to various social, economic, cultural, political and technological changes in its immediate and intermediate milieu. In its 393 years of existence, it has demonstrated numerous academic feats and won honors accorded by various entities. However, the fact still remains that the university cannot rest on its laurels. Its stability and survival depends on its willingness to be open to the signs of the times. Technology, considered as the new language of teaching and learning, is an irrevocable reality. The university must look into the future without losing sight of its core capabilities-the malleability of its faculty members. Taking full advantage of technological opportunities has required many difficult adjustments. Any form of institutional adjustment should be user-friendly, non-threatening and must arouse heightened commitment and stimulate positive and lasting growth and development consistent with set standards of quality, excellence and responsiveness.

This preliminary investigation purports to determine the context of information technology preparedness of a comprehensive university by establishing a database of teachers' entry capabilities as to the extent of use of information technology vis-à-vis their interest levels. Such a database can serve as a decision making platform in designing a professional development program for teachers, maximizing the cogent use of IT in transforming the teaching and learning process.

Related Literature

The integration of technology in the curriculum is relatively new in the field of education. Technology in its essence initially started in the late 1960's with the emergence of computers. As years progressed, there was a great increase in the development of software and computer programs that created the impetus for its inclusion in education.

A study on technology integration in an elementary school in Colorado revealed that technology can create productive outputs among teachers. Wilson (1995) comments that technology has changed the way teachers work, both instructionally and professionally, resulting in a net increase of hours and at the same time greater productivity, effectiveness and satisfaction. Making use of surveys and interviews, the study disclosed the following: that students are using technology in the classroom, technology is changing classroom practice, technology has changed teacher's beliefs and attitudes, students learn effectively using technology, students are motivated to learn with technology, technology is a vehicle for many of the school's reform initiatives and that successful implementation of technology

can be brought about by the students, teachers and administrators.

In a similar study made by Yuen (2003) in Hong Kong, it was evident that through information and communication technology, network learning collaboration is made possible. Using projects and interview transcripts of eight hundred primary students and twenty four teachers from primary schools in Hong Kong, results yield that with the use of KF(Knowledge Forum), a program that made use of ICT, students' active engagement, participation in groups, discourse among community members and open access to shared information were greatly supported. The study hopefully can be duplicated so as to present a more integrated picture of the use of technology in building learning communities.

Trinidad, MacNish, Aldridge, and Fraser (2004) identify technology as a factor in encouraging senior college students in becoming more self-directed learners. The same study shows that teachers are making substantial progress in their teaching with the use of ICT. Covering a period of three years and using analysis of school documents, interviews and class observations, findings also suggest that ICT makes possible individual instruction and collaborative learning. The use of information and communication technology in schools would possibly result in the desired learning outcomes if the strategies have been effected in the teaching practices.

The body of research on teachers' attitudes towards ICT is becoming more substantial. Ng and Gunstone (2003), in their study of secondary science teachers and computer based technologies, consider that the motivation of teachers plays a significant role in the use of ICT in the classroom. Teachers see great potential in the use of machines in assisting with learning and teaching. Making use of a survey with open-ended questions, the study revealed that science teachers acknowledge the importance of computer-based technologies in science teaching and learning and most teachers feel comfortable in using them for their personal use. Variation in technology-use of schools was also evident in the study.

Williams, Coles, Wilson, Richardson, and Tuson (2000) summarize the relationship of teachers and ICT in their study. Using schools in Scotland as their primary source of data, the study indicates the relatively low use of ICT and a number of key issues which have implications for teacher training and development. It has been shown that teachers are on their early stages of ICT development. Knowledge and skills are the key to effective implementation of ICT. Furthermore, appropriate training, ready access to ICT resources and ongoing support and advice to encourage progression beyond formal training are required in order to engender a more holistic approach.

Interestingly, Whitaker and Coste (2002) made a study on the use of IT by teachers in Maine and saw a great improvement after an assessment in two-years time. Using a model of interdisciplinary strategic development using IT for the faculty, the study showed an increase of ninety percent (90%) in the use of e-mail and listserves, a forty-four percent (44%) increase in the utility of computer functions and an eighty percent (80%) increase in Internet use. Clearly, the research suggests a great degree of success in establishing an IT environment in the college.

Methodology

Descriptive in methodology, this research component analyzed the IT entry level of knowledge and skills of UST faculty members representing various academic colleges, faculties and schools, namely: Architecture and Fine Arts (10), Arts and Letters (21), Commerce (16), Education (32), Elementary (21), Engineering (38), Graduate School (5), High School (22), Rehabilitation Sciences (14), Institute of Physical Education and Athletics (15), Institute of Religion (25), Medicine (25), Nursing (13), Pharmacy (70), and Science (31).

The study made use of a survey-questionnaire designed by the researchers. The questionnaire was made up of four parts, namely; Part I (Demographic Profile), Part II (IT Knowledge and Skills of Teachers), Part III (Interest Level of Teachers) and Part IV (Potential Problems in ICT Implementation). To ensure the consistency of items, the researcher-made instrument was fielded to a select group of teachers randomly chosen from the various colleges in the university. The use of the Spearman-Prophecy formula yielded an internal consistency index of .85. The questionnaires were then distributed to the target teachers through the Offices of the Deans of the different colleges and institutes.

A total of 358 or 30% of the fulltime faculty members took part in the investigation. They were selected through stratified sampling. Based on the data gathered, the majority of the respondents were female (52.1%); married (52.94%); and handling both content and skills-based courses (66.39%). Respondent teachers belonging to the 36-40 age group and who have been teaching for about 16 to 20 years tended to predominate. Only 63 or 17.65% of the respondents have master's degrees and were receiving 10000-20000 (Php) in monthly incomes.

Results and Discussion

Perceived IT Entry Knowledge and Skills of Teachers

Computer users undergo the various stages of computer literacy. They are categorized as tourists or casual users, sojourners or daily users, voyagers or expert users, and ambassadors or power users.

Considering the multifaceted strategic, tactical; and institutional tasks of faculty members in the university vis-à-vis the disparities of resources available at home, personal priorities, technological exposure and attitudes, teachers may vary significantly in their IT entry knowledge and skills.

The IT entry level of knowledge and skills were assessed, based on the following classifications: foundational, word processing, electronic spreadsheet, productivity tools and information gathering. Findings show, (see Table 1) that among the five dimensional skills, word processing skills ranked first with a weighted mean of 3.45 (Adequate Knowledge); Foundational skills ranked second with a 3.13 weighted mean (Adequate Knowledge). Information-gathering skills ranked third, at 3.01 (Adequate Knowledge), electronic spreadsheet skills is fourth with a 2.75 weighted mean (Adequate Knowledge). Productivity skills are last in ranks at 2.53 (Adequate Knowledge).

The findings can be attributed to the usual observation that, generally, teachers recognize the unique features of word processing software only when typing documents such as test papers. Apparently, teachers have not fully explored the hidden features of the program which can further enhance word document preparation. On the other hand, the proliferation of computer terminals in various areas in the university such as the learning resource units (LRU's), the faculty area in the library and the faculty rooms, has in one way or another, facilitated the exposure to and extent of use of teachers of various forms of technology made available by the administration, as indicated in the faculty members' response that they had adequate foundational skills.

Table 1. *IT Entry Knowledge and Skills of Faculty*

IT Entry Knowledge and Skills	Weighted Mean	Verbal Interpretation
Word Processing Skills	3.45	AK
Foundational Skills	3.13	AK
Information Gathering Skills	3.01	AK
Electronic Spreadsheet	2.75	AK
Productivity Tools	2.53	AK

Note. Legend: 1.00-1.49 Very Little Knowledge (VLK); 1.50-2.49 Little Knowledge Adequate Knowledge (AK); 3.50-4.49 Knowledgeable to a Great Extent (KGE); 4.50-5.00 Knowledgeable to a Very Great Extent (KVGE)

In regard to information gathering skills the response of teachers shows that they recognize the universal function of the Internet. There is a great need to train and re-train teachers in how to access voluminous amounts of information from various and eclectic sources. One of the most potent sources of information needing much filtration and careful selection is the worldwide web. This network of information offers an array of information which is both quick to access and is up to date. Though the Internet offers tremendous amounts of information, this information should be used only to supplement and complement information from printed materials.

Teachers today recognize themselves as facilitators of learning. Hence, they are expected to make learning easy and meaningful to students. Teachers should, therefore, develop visual literacy. They should be trained to make full use of computers as far as productivity tools are concerned for these can ultimately revolutionize their instruction.

Moreover, the fact cannot be denied that spreadsheet programs like excel and daceasy can be termed as occasional software in the teaching profession, and unpopular software among teacher practitioners. This is because teachers in the field can make full use of this software only during grade computation. Most of the time, teachers resort to the traditional way of computing grades using pencil, paper and the calculator. With the gradual introduction of user-friendly and non-threatening IT programs on electronic spreadsheets, teachers can realize how automated computation of grades speeds up measurement and the evaluation process.

Revitalizing institutional efforts on all levels of instruction always yields results beneficial to learning. When faculty development programs are institutionalized, there is continuous recognition of the need for remedies for prevailing problems and issues in school. As an essential and permanent feature of the institution, faculty development programs may not always address the felt needs and concerns of the faculty. The resulting scenario, according to Argyris and Schon, as cited in the book of Heller (1982), is termed single-loop problem solving or single loop learning which infers inability to identify the causal role of one's own model and the continual application of a model which does not

address the fact but adds to its seriousness. On the other hand, the challenge to schools as learning organizations is to develop the ability to inquire into and specify the principles that guide individual behavior and determines their consequences. This ability, according to Argyris and Schon, is termed as double-loop learning.

Interest Levels of Teachers

To avoid any possible mismatch between the felt instructional needs and problems of teachers and the anticipated plan of action, policy-makers and program planners are duty-bound to determine the interest level of teachers who are always at the forefront of the entire educational process.

To concur with the foregoing educational dictum, this research component attempts to identify the varying interest levels of faculty members representing various areas of interest and instructional emphasis. Among the anticipated program content areas in Table 2, UST faculty members expressed their interest to a great extent (GE) on "Production and presentation of materials using the overhead projector" (3.85). This form of technology is not yet obsolete. Through the years, this has been abused, misused and overused by faculty members, not to mention the limited number and policy guidelines on the use of the equipment. It is high time that teachers be trained to realize the fixative, distributive and manipulative properties of this educational technology. The extent of success of training in the use of this equipment can be further realized if proper training on the production of related software such as transparencies employing various techniques, such as unveiling, overlaying and multi-dimensional sketching, are fully integrated in the program design course. The production process can be best facilitated when the teacher's learning of the use of various computer programs is put into practice to better serve instructional thrusts and objectives. Findings in the study of Whitaker and Coste (2002) identified video, overhead projectors, computers, internet/web and e-mail and listserves as tools that have great use in the classroom and have served as tools for faculty in teaching.

Table 2. *Interest Levels*

Interest Levels	Weighted Mean	Verbal Interpretation
Overhead Projector	3.85	ME
Slide Projector	3.67	ME
Opaque Projector	3.46	SE
Video Presentations	3.46	SE

Note. Legend: 1.00-1.49 Very Little Extent (VLEK); 1.50-2.49 Little Extent (LE); 2.50-3.49 Some Extent (SE); 3.50-4.49 Great Extent(GE); 4.50-5.00 Very Great Extent (VGE)

Faculty members also expressed their heightened interest level to a great extent (GE) in terms of the production and presentation of materials through slide presentations (3.67). The concept of a sense of urgency and importance supports this disclosure. With the proliferation of individual and group presentations, facilitated by visually stimulating power point presentations, teachers could be given the corresponding training on the preparation and evaluation of slide materials, using a wide range of topics in their respective disciplines. Psychology posits that the span of attention of students, particularly those at the university level, may be increased through well planned and selected learning content and materials. Materials preparation is one of the neglected areas in teacher training and development. With the strong interest level of faculty members, and accompanying institutional support and structure, high success index program implementation can be easily realized. In the case of the University of Santo Tomas, the locus of this study, the foregoing input criteria are already evident.

Other program content areas where teachers expressed their interest level to some extent (SE) include "Production and presentation of materials using the opaque projector" and "Production of teaching aids with the use of the video camera" (3.46); "Editing and digital production of teaching aids" (3.30); "Multimedia production and presentation of lessons" (3.26), "Production of visual materials using single-reflex camera" (3.15); "Presentation of lessons using studio productions" (3.04); "Preparation and presentation of materials for radio and television broadcast" (2.89) and "Production of teaching aids for radio and television broadcast" (2.86). These findings infer that though teachers realize the potential help and benefit they may get from modern educational technology, their interest level is conditioned and determined by their immediate needs and concerns vis-à-vis institutional capability and their ability to cope with such technologies.

The use of Tukey's Significant Difference showed that among the interests of the faculty, "production and presentation of materials using the overhead projector" has a significantly higher rating (3.85) compared to the rest, with the exception of "production and presentation of materials in slides" (3.67).

Problem Forecasting

Considering the dynamism of the school environment, factors within and outside individual priority areas, the beliefs and values system of the different school sectors, program planning, design, implementation and evaluation will always be plagued by risks, certainties and uncertainties. These conditions, when not managed intelligently by key implementers, are likely to lead to program entropy or atrophy. If this happens, more educational wastages are expected.

As the table indicates, among the potential problem areas that may affect program implementation success, were the top five (5) ranking indicators : "The regular teaching load is 24 units." (3.27); "The facilities used in the workshop are not available at home." (2.98); "The recommended facilities are not affordable." (2.82);" "The schedules of the seminars and workshops are in conflict with school deadline;" "I have more than three preparations in teaching" (2.76), and "Family needs are my priority before seminars and workshops"(2.71). These factors are both institutional and attitudinal in nature. Institutional problems, on one hand, are perennial in nature. Information dissemination strategies of faculty members on what is available and what could still be provided for should be communicated, both in oral and written forms, horizontally and vertically. Attitudinal problems on the other hand, call into question the priority system of faculty members and also calls for retooling efforts on the part of the administration to design a responsive faculty development program that fosters quality and excellence but limits conflict and mediocrity. The foregoing problem indicators were perceived to be problem areas by the study respondents to some extent (SE) only.

Table 3. *Perceived Problems in IT Use*

Problems	Weighted Mean	Verbal Interpretation
Regular load is 24 units.	3.27	SE
Facilities are not available at home.	2.98	SE
Facilities are not affordable.	2.82	SE
Schedules of seminars are in conflict with school deadlines.	2.76	SE
I have more than 3 preparations.	2.76	SE
Family's needs are more important.	2.71	SE

Note. Legend: 1.00-1.49 Very Little Extent (VLEK); 1.50-2.49 Little Extent (LE); 2.50-3.49 Some Extent (SE); 3.50-4.49 Great Extent(GE); 4.50-5.00 Very Great Extent (VGE)

Conclusion

This preliminary study, though confined to only one comprehensive university has yielded some interesting results, which when magnified and qualitatively explored, might pose constructive insights and at the same time facilitate program planning and decision-making relative to the continuing professional development of teachers. The imperatives of this study are structural and attitudinal. The structural dimension implies the need to institutionalize a program structure that addresses the differing baseline characteristics of the teachers in terms of their technological knowledge and skills which invite the identification of a continuum of professional development program where IT-targeted users progress from one level to another vis-à-vis the predefined set of techno-pedagogical competencies.

By and large, effort to institutionalize a technological training platform must ensure flexibility (time and scheduling), articulation (content and skills progression), synchronicity (alignment to instructional tasks and activities), and teaming (technological and pedagogical collaboration among the intended users).

The attitudinal dimension of the findings of the study will gauge the ability of university teachers to address the need for a more effective and responsible teaching where there is a systemic renewal of their attitudes toward professional development (Godfrey, 2001b). Such development requires teachers to continue learning throughout their career, deepening knowledge, skills, judgment, keeping abreast of important developments in the field and experimenting with innovations that promise improvements in practice (Brow, Boyle, & Boyle, 2002). Pollak and Mills as cited in Edwards, Green, and Lyons (2002) suggest that principals or administrators are responsible for empowering teachers. While it is true that teacher empowerment is not a one-shot activity, it has to be viewed as an ongoing process of identifying, retooling and enhancing teachers' professional preparation. Program planners are expected to ensure that professional development activities are needs-based, competency-based, value-based and future-based in order to maximize teacher participation and institutional investment.

If faculty development programs are to be considered as a source of empowerment, then critical success factors such as form, duration, collective participation, content, active learning and coherence should be given equal attention (Lewis, 2002; McKinnon, 1996).

Training teachers to make full use of technology can be considered as a transformational agenda of today's university. To capitalize on teachers' malleability and high degree of openness in retooling their expertise is a calculated risk. Teachers' instructional expertise which refers to their implicit and explicit knowledge of various teaching strategies and methods to attain predefined instructional objectives may be further enhanced once coupled with judicious use of technology. Technological plans assume this role of change catalyst when teachers begin to see technology as an enabler, and not a constraint in the performance of their instructional tasks. Moreover, teachers feel that they are empowered if access to decision-making allows their active participation in the design, development, implementation and evaluation of the IT program .

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Received March 18, 2004
Revision received October 29, 2004
Accepted December 10, 2004